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The Delphi n Integrated View

Title: **JP7202040A2: CHARGE-UP DETECTION DEVICE**

Country: **JP Japan**
Kind: **A**

Inventor: **KUBO HIROKO;**

Assignee: **MATSUSHITA ELECTRON CORP**
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Priority Number: 1993-12-28 **JP1993000336165**

Abstract:

PURPOSE: To provide a floating gate type EPROM which does not imperfectly operate when it is irradiated with short wavelength ray like ultraviolet ray.

CONSTITUTION: A source 102 and a drain 103 are formed on the surface of a semiconductor substrate 101, and a tunnel oxide film 105 is formed on the drain 103. On the main surface of the semiconductor substrate 101, the following are formed; a gate oxide film 104, a floating gate 106, an interlayer insulating film 107, a control gate 108, an interlayer insulating film 109, a metal electrode 110, and a light shielding film 111.

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Family: None

Other Abstract Info: CHEMABS 123(20)273688K CHEMABS 123(20)273688K DERABS C1995-375988 DERABS C1995-375988

CLAIMS

[Claim 1] The tunnel oxide film is formed on the gate oxide film and the aforementioned drain the source and the drain which were alternatively formed in the front face of a semiconductor substrate, and on the aforementioned semiconductor substrate principal plane. on the aforementioned gate oxide film The floating gate, Charge-up detection equipment characterized by forming the control gate through the 1st layer insulation film on the aforementioned floating gate, and forming the shading film through the 2nd layer insulation film on the aforementioned control electrode at least.

[Claim 2] Charge-up detection equipment [equipped with the shading film which intercepts short wavelength light 3eV or more 90% or more] according to claim 1.

DETAILED DESCRIPTION

[0001] [Industrial Application] this invention relates to the charge-up detection equipment for measuring the voltage of the charge up generated on a silicon wafer in the manufacture process of a semiconductor device.

[0002] [Description of the Prior Art] In recent years, floating-gate type EEPROM is used as detection equipment of a charge up generated on a silicon wafer in the manufacture process of a semiconductor device. Since Vt will shift floating-gate type EEPROM according to the size if voltage is impressed, it can detect charge-up voltage by measuring the shift amount of Vt when charge-up voltage is added.

[0003] The conventional floating-gate type EEPROM is explained below. Drawing 2 shows the cross-section composition of the conventional floating-gate type EEPROM. In this drawing, the semiconductor substrate which 1 becomes from silicon, the source with which 2 was alternatively formed in the front face of the semiconductor substrate 1, and 3 are the drains alternatively formed in the front face of the semiconductor substrate 1. The gate oxide film by which 4 was formed on the principal plane of the semiconductor substrate 1, and 5 are the tunnel oxide films formed on the drain 3, in order to use as a tunnel field. The thickness of the tunnel oxide film 5 is 30-100nm according to target sensitivity. The floating gate which consists of polycrystal silicon with which 6 was alternatively formed on the gate oxide film 4, and 7 are the layer insulation films formed on the floating gate 6. 8 is the control gate which consists of polycrystal silicon formed on the layer insulation film 7. 9 is a layer insulation film and 10 is a metal electrode.

[0004] Operation of the charge-up detection equipment of the above composition is explained. When positive voltage is impressed to the control gate 8 and a drain 3 is grounded, an electron tunnels the inside of the tunnel oxide film 5, and an electron is poured into the floating gate 6. This shifts Vt of floating-gate type EEPROM to the higher one (write-in state). If negative voltage is impressed to the control gate 8 and a drain 3 is grounded this and reversely, an electron will be removed from the floating gate 6 and Vt will be shifted to the lower one (elimination state).

[0005] Thus, Vt of floating-gate type EEPROM changes according to the voltage and polarity which were impressed to the control gate 8. Charge-up voltage can be presumed from Vt shift amount using this property.

[0006][Problem(s) to be Solved by the Invention] However, with the above-mentioned conventional composition, if ultraviolet rays are irradiated from the exterior where an electron is poured into the floating gate 6 (write-in state) since the ultraviolet rays from the outside cannot be intercepted, this will arrive at the floating-gate 6 neighborhood. The electron which the electron in the floating gate 6 was excited by these ultraviolet rays, and was further excited vanishes to the control gate 8 or the semiconductor substrate 1. It had the fault that as a result the charge in the floating gate 6 was incorrect-eliminated.

[0007] this invention solves the above-mentioned conventional trouble, and aims at offering floating-gate type EEPROM which does not malfunction even if short wavelength light, such as ultraviolet rays, is irradiated.

[0008] [Means for Solving the Problem] In order to attain the above-mentioned purpose the charge-up detection equipment of this invention The tunnel oxide film is formed on the gate oxide film and the aforementioned drain the source and the drain which were alternatively formed in the front face of a semiconductor substrate, and on the aforementioned semiconductor substrate principal plane. on the aforementioned gate oxide film The floating gate, The control gate is formed through the 1st layer insulation film on the aforementioned floating gate, and the shading film is formed through the 2nd layer insulation film on the aforementioned control electrode at least.

[0009] [Function] By this composition, since the incidence near the floating gate of short wavelength light, such as ultraviolet rays, can be prevented, voltage can be held correctly and a malfunction can be lost.

[0010] [Example] It explains referring to a drawing about one example of the charge-up detection equipment of this invention.

[0011] Drawing 1 shows the cross-section composition of the charge-up detection equipment in one example of this invention. The semiconductor substrate which 101 becomes from silicon in this drawing, the source with which 102 was alternatively formed in the front face of the semiconductor substrate 101, The drain with which 103 was alternatively formed in the front face of the semiconductor substrate 101, the gate oxide film by which 104 was formed on the principal plane of the semiconductor substrate 101, The tunnel oxide film formed on the drain 103 in order to use 105 as a tunnel field, The floating gate which consists of polycrystal silicon with which 106 was formed on the gate oxide film 104, As for the control gate which consists of polycrystal silicon with which 107 was formed in the layer insulation film and 108 was formed on the layer insulation film 107, and 109, a layer insulation film and 110 are metal electrodes, and these are the same as the composition of the conventional example. 111 is (Aluminum aluminum) shading film formed on the layer insulation film 109.

[0012] The operation is explained about the charge-up detection equipment of the above composition. When positive voltage is impressed to the control gate 108 and a drain 103 is grounded, an electron tunnels the inside of the tunnel oxide film 105, and an electron is poured into the floating gate 106. This shifts Vt of floating-gate type EEPROM to the higher one (write-in state). If negative voltage is impressed to the control gate 108 and a drain 103 is grounded this and reversely, an electron will be removed from the floating gate 106 and Vt will be shifted to the method of a low (elimination state).

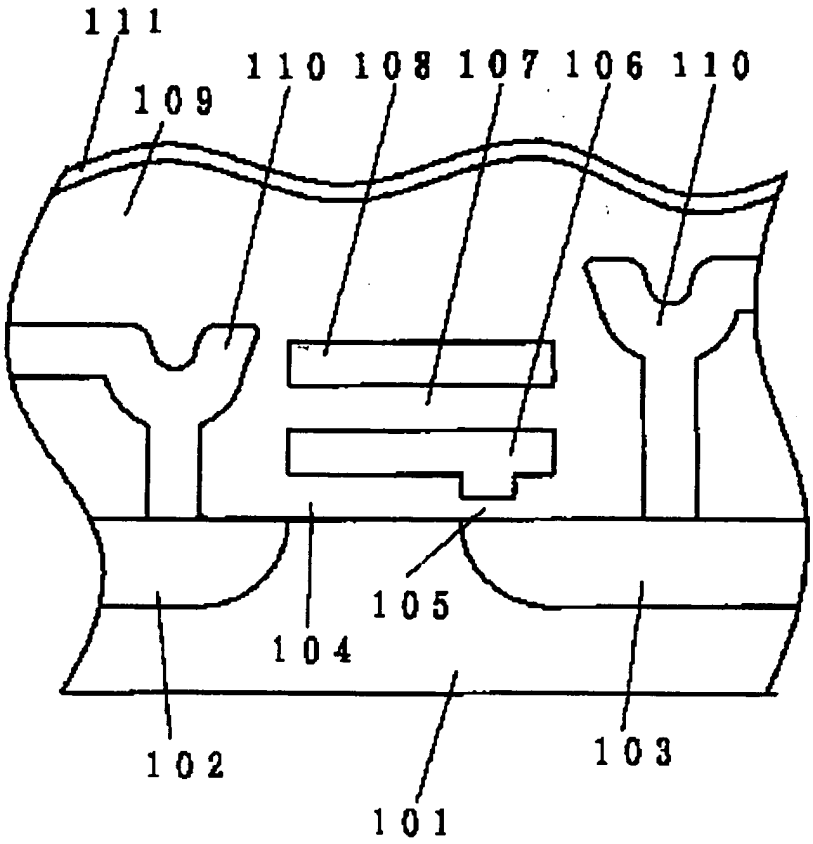
[0013] Thus, Vt of floating-gate type EEPROM changes according to the voltage and polarity which were impressed to the control gate 108. Charge-up voltage can be presumed from Vt shift amount using this property.

[0014] With the composition of this example, since it is intercepted by aluminum shading film 111 and the incidence to the floating-gate 106 neighborhood can be prevented even if short wavelength light, such as ultraviolet rays, is irradiated, where an electron is poured into the floating gate 106 by having had aluminum shading film 111 on the layer insulation film 109 (write-in state), the electron in the floating gate 106 is not excited, but voltage is held correctly.

[0015] As mentioned above, according to this example, short wavelength light, such as ultraviolet rays, can be intercepted by forming aluminum shading film 111, and a malfunction can be lost.

[0016] In addition, although aluminum shading film 111 was used as a shading film in this example, if it is the shading film which intercepts short wavelength light 3eV or more 90% or more, it cannot be overemphasized that it is good also considering this as W, Pb, etc.

[0017] [Effect of the Invention] this invention can realize the outstanding charge-up detection equipment whose precision which there is no malfunction and detects voltage improved by preparing the shading film which intercepts short wavelength light, such as ultraviolet rays.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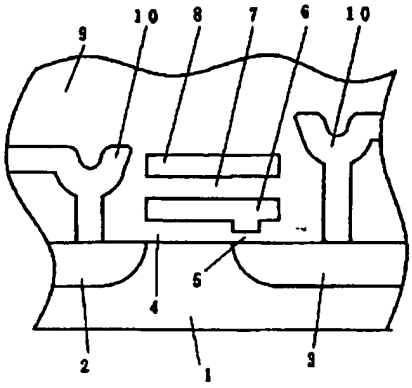
Drawing selection drawing 2



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